

LETTERS TO THE EDITOR.

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One Vote, One Value.

A CERTAIN class of problems do not as yet appear to be solved according to scientific rules, though they are of much importance and of frequent recurrence. Two examples will suffice. (1) A jury has to assess damages. (2) The council of a society has to fix on a sum of money, suitable for some particular purpose. Each voter, whether of the jury or of the council, has equal authority with each of his colleagues. How can the right conclusion be reached, considering that there may be as many different estimates as there are members? That conclusion is clearly *not* the average of all the estimates, which would give a voting power to "cranks" in proportion to their crankiness. One absurdly large or small estimate would leave a greater impress on the result than one of reasonable amount, and the more an estimate diverges from the bulk of the rest, the more influence would it exert. I wish to point out that the estimate to which least objection can be raised is the *middlemost* estimate, the number of votes that it is too high being exactly balanced by the number of votes that it is too low. Every other estimate is condemned by a majority of voters as being either too high or too low, the middlemost alone escaping this condemnation. The number of voters may be odd or even. If odd, there is one middlemost value; thus in 11 votes the middlemost is the 6th; in 99 votes the middlemost is the 50th. If the number of voters be even, there are two middlemost values, the mean of which must be taken; thus in 12 votes the middlemost lies between the 6th and the 7th; in 100 votes between the 50th and the 51st. Generally, in $2n-1$ votes the middlemost is the n th; in $2n$ votes it lies between the n th and the $(n+1)$ th.

I suggest that the process for a jury on their retirement should be (1) to discuss and interchange views; (2) for each jurymen to write his own independent estimate on a separate slip of paper; (3) for the foreman to arrange the slips in the order of the values written on them; (4) to take the average of the 6th and 7th as the verdict, which might be finally approved as a substantive proposition. Similarly as regards the resolutions of councils, having regard to the above $(2n-1)$ and $2n$ remarks.

FRANCIS GALTON.

A New Volcanic Island.

THE officer in charge of the Marine Survey of India, Commander W. G. Beauchamp, R.I.M., has forwarded the following description of Volcano Island derived from an examination made about sixteen days after its appearance above water. The island is situated off the coast of Arakan, in the Bay of Bengal, about nine miles to the north-westward of Chebuda Island, and has a greatest length of 307 yards in a S.S.W. and N.N.E. direction, and a greatest breadth of 217 yards in a N.W. and S.E. direction; the summit is 19 feet above high water.

Except close to the shore, the soundings in the neighbourhood appear to be unaltered, including the shoal to the N.N.W. which was touched on one line of soundings. The ship approached the island from the north-eastward, and left in an E.S.E. direction. A steam cutter left to the southward for ten miles and returned from S.S.E., and on neither course was any discrepancy in the chart discovered.

The island is still in an active condition at the northern end, several hot springs of liquid mud overflowing. It is steeper on the western side.

Temperatures (Fahrenheit) were taken at different parts of the island, the surface registering 81° , being the same as the atmosphere; at 2 feet below the surface 96° , 3 feet below surface 104° . But at the observation spot on the summit, and evidently the main crater, the temperature at 1 foot below the surface was 104° , at 2 feet below 108° , at 3 feet below 138° , and at $3\frac{1}{2}$ feet the thermometer

rose to 148° . No self-registering thermometer was available to take the temperature of the liquid mud. The ordinary thermometer could not be cleaned quickly enough to get an accurate reading.

The island is evidently becoming hard, but the action of the sea and tide is washing it away considerably at present, leaving a wake of discoloured water, giving the appearance of a shoal spit. The Admiralty charts show that several mud volcanoes exist in the neighbourhood.

Drift-wood, sand, and stones were found, although the island was only fifteen or sixteen days old. Fourteen kinds of seed were collected by the surgeon naturalist, from whose geological report it appears that the island is composed wholly of greyish-brown mud of uniform quality throughout; with this are a few angular fragments of rocks of various kinds intermingled. These must have been thrown up with the mud; they include:—(a) portions of a laminated sandstone; (b) a compact grey rock which has the appearance of a limestone, but which is only partially soluble in strong acids; (c) lumps of crystalline calcite; (d) a soft green stone, probably a basic igneous rock.

On December 31, 1906, the surface was sun-dried and hardened, so as readily to support the weight of a man. The dried surface is very uneven throughout; it has a nodular and bubbly appearance; besides this, it is split up by deep fissures, due to shrinkage in drying.

On the north side of the island are several small vents. Three of these open into round pools of liquid mud, to the surface of which large bubbles of gas are continually rising. This gas is non-inflammable, and does not support combustion; it has an objectionable sulphurous smell.

In regard to the permanence of this island, considering the nature of the material of which it is composed it is likely that heavy rains and sea action in the south-west monsoon will cause rapid disintegration and total disappearance, always provided that no more material is erupted.

The following case may be quoted from Lyell's "Principles of Geology," vol. ii.:—In 1811 the Isle of Sabrina was formed off the Azores by submarine volcanic action. This, although 300 feet high, "was soon washed away by the waves."

A. MOSTYN FIELD.

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The Forest-pig of Central Africa.

As will be remembered, the singular and interesting forest-pig, *Hylochoerus meinertzhageni*, which appears to be an intermediate link between the true Sus and the aberrant Phacochoerus was first mentioned and named by my friend Mr. Oldfield Thomas in these pages (NATURE, vol. lxx., p. 577, 1904). I believe, therefore, that some further information which widens considerably its range may prove of interest to readers of NATURE.

The type of this remarkable pig is the cranium of a nearly adult male from the Nandi country (E.N.E. of the Victoria Nyanza), sent home by Lieut. R. Meinertzhagen, and now in the British Museum; this, with parts of the skulls of an older male specimen and of a sow, with portions of the skin covered with long black hair of the first, are the materials on which Mr. O. Thomas has described this species (Proc. Zool. Soc. London, 1904, ii., p. 193, pl. xiv., xv.). Since then further materials have been received by the British Museum, also the skull of what appears to be a second species (Proc. Zool. Soc. London, 1906, p. 2).

The Royal Zoological Museum of Florence received a few months ago from Lieut. Ernesto Brissoni, an officer in the service of the Congo Free State, a perfect cranium of a large full-grown male of *H. meinertzhageni*, shot by him at Sendue, on the Upper Congo River, where he was stationed for many months in November, 1904. It is a remarkably big and massive skull, as will be seen by the principal measurements, which, to facilitate comparison, I give in the same order as those taken on the type-specimen by Mr. Thomas; they are in millimetres:—greatest median length, above 425; basal length, 360; zygomatic breadth, 250; nasals, length 260, breadth 70; interorbital breadth, 123; tip to tip of post-orbital processes, 155; intertemporal breadth, 98; breadth across

lateral occipital protuberances, 140; height from basion to top of occipital crest, 137; least breadth maxillary zygomatic process, 70; breadth across sockets of canines, 70; breadth across tips of canines, 290; length of palate, 270; least palatal breadth, between m^2 , 40; basal diameter of canine, 40; lower jaw, length, bone only, 325; breadth across symphysis at base of canines, 130; least breadth across diastema, 105; height at diastema, 55; tip to tip of canines, 225; basal diameter, outer face of canines, 22, inner face, 24, posterior face, 16; horizontal length of p^1 , 15, of m^1 , 19, of m^2 , 26.5, of m^3 , 45.

Dental formula: $i. \frac{1}{2}. c. \frac{1}{2}. p. m. \frac{3}{4}. m. \frac{3}{4}$.

As I have said, this cranium is massive, the bones rugose on their outer surface, the nasals mostly fused together, and the frontal depression strongly marked.

HENRY H. GIGLIOLI.

Florence, Royal Zoological Museum, February 17.

Gambling and Mathematics.

YOUR reviewer "G. H. B." suggested in NATURE of January 31 (p. 318) that every schoolboy should know something about choice and chance in order that he may not develop into a gambler. I agree with him. But one may suspect that gamblers are either those who have not had the advantages of a mathematical education or those who belong to "slow dull" grade and are unable to appreciate those advantages; and yet one may be quite unable to prove that this is really the case.

Can any of your correspondents bring forward evidence to show that mathematicians gamble less than other men, or that gamblers really are mathematically defective?

The matter is important as indicating the point at which the efforts of an anti-gambling league should be most usefully applied. Is it in the intelligent teaching of mathematics? And are we right in distrusting the methods of exhortation when the methods of algebra will suffice?

Bootham School, York.

HUGH RICHARDSON.

THE subject of Mr. Richardson's letter raises a wide field of discussion, of which the few words in my notice convey a very imperfect idea. I should like to see the matter discussed in a suitable quarter when such can be found, but I believe it is a question for psychologists as well as mathematicians.

I take it that the ordinary gambler speculates in order to win, and that the prospect of winning is the incentive which does the greatest harm.

When a man speculates by staking, say, 1*l.* on the chance of winning 100*l.*, the notion of winning 100*l.* makes a big impression on his mind, and means something more real to him than the idea that the odds are 200 to 1 against him (say). He forms a clear mental picture of the prize, and the odds do not present the same picture to his mind. Consequently, he exaggerates his prospects. What I meant to imply is that schoolboys ought to learn to calculate probabilities, so that when they grow up they should think as clearly and form as strong mental pictures of the odds against them in a game of chance as they do of the value of the prizes, and that they should learn to calculate expectations and to think of these rather than of the prizes.

But when Mr. Richardson uses the word "algebra" he implies something different from what I mean, which is more correctly described as arithmetic. What I should like would be to see a chapter on probabilities treated in an elementary course of arithmetic, and boys familiarised with the idea of probability calculations, the representation of probabilities by fractions, and the calculation of expectations, without any algebra being put in to puzzle them. Quite simple questions, in fact. I will not say that everyone who had studied probabilities would not indulge in a game of chance now and then, but they would go in with the expectation of losing rather than winning, and they would know it was no use to try to make up a loss by making false estimates of the probability of the luck turning. If nobody gambled except for the amusement, and if everybody before doing so made a calculation beforehand as to how much they were prepared to pay for that amusement, realising that their expectation in every case was a

loss (if playing against a bank), the worst evil of gambling would be eliminated. The only difficulty would be the psychological one of preventing a man from being carried away by his excitement.

What people should know is that to speculate against a bank or syndicate is a bad investment, and that even to speculate where all profits are distributed between players is not a paying investment, but is really also a bad investment even if the expectation equals the man's stake, on the ground that a bird in the hand is worth two in the bush. The loss of the bird in the hand means a definite loss of income; the expectation cannot be regarded as income.

G. H. B.

Some New Methods in Meteorology.

SINCE the appearance in NATURE of December 20, 1906, of my review of Prof. Bigelow's "Studies" under the above title, I have had some correspondence with Prof. Willis L. Moore, chief of the U.S. Weather Bureau. I am glad, with Prof. Willis Moore's sanction, to quote part of his letters to me, which will, I hope, allay any apprehensions which may have been aroused as to the methods of research likely to be adopted at the new Mount Weather Observatory. Prof. Moore writes:—"... Since June, 1905, Prof. William J. Humphreys, of Johns Hopkins University, and formerly Professor of Physics at the University of Virginia, has been Supervising Director at our institution at Mt. Weather. We wish to ascertain facts by experimentation, rather than to exploit theories, however beautiful they may be. We consider Prof. Bigelow's numerous papers as expressing simply his own views. ... Neither myself nor any member of my staff desires to be considered responsible for any theories that may be advanced in the publications of the Bureau, except he be the author."

Prof. Willis Moore's explanation, and his recognition of experiment as the necessary and ultimate criterion, justify the expectation that, backed as it is by the resources of the U.S. Weather Bureau, the new research observatory at Mount Weather will prove a most useful institution for the advancement of scientific meteorology.

CHARLES CHREE.

PAGAN RACES OF THE MALAY PENINSULA.¹

THE scope of this work, which runs to nearly 1600 pages, is defined in the preface, where it is stated to be "essentially a compilation from many sources," but differing from most books of that kind, "first, in being based to a very large extent on materials hitherto unpublished, and accessible only through private channels of information, and secondly in having been constructed with special knowledge of the subject and in a critical spirit."

Accurate though these statements be, they offer but slight indication of how thoroughly the book is inspired with the experience and critical knowledge of the authors, and how well the subjects dealt with have been unified in their hands, a task the difficulty of which may be judged in part by a consideration of the unsatisfactory nature of much that has been written as well as by the length of the bibliography which follows the preface. The authors explain that the several parts of the book dealing with the physical and cultural characteristics of the tribes had been originally arranged under subject headings, and that the book was then re-written upon "a phylogenetic system, so as to throw into relief the differences which separate one race from another," a plan which no one will doubt has added immensely to the clarity of the work. Although the title-page bears the name of both authors, the greater part of the work has been written by Mr. Skeat, Mr. Blagden

¹ "Pagan Races of the Malay Peninsula." By W. W. Skeat and C. O. Blagden. Vol. i., pp. xi+724; vol. ii., pp. xi+835. (London: Macmillan and Co., Ltd., 1906.) Price 42s. net.